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Research Article

TEACHING GRAPHS TO STUDENTS WITH VISUAL IMPAIRMENT IN INCLUSIVE SCHOOLS

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Abstract

This present study aimed to explore the level of performance of graphs skills among students with visual impairment. Here in this study, the performance was measured in terms of plotting and finding points in the Cartesian plane using tactile/ any other graphing aid. In addition, this study attempted to find out the method of answering to graph questions in the tests/ exams. This survey study comprised of 30 special teachers. The tool used in the study was a questionnaire containing 20 questions focussing on level of performance of graph skills among students with visual impairment, plotting and finding points in the Cartesian plane using tactile / any other graphing aid and the method of answering to graph questions in the tests/exams. The results revealed that there were scanty number of aids/ devices to perform graphs and all the students with visual impairment used scribe to answering graph question in the test/ exam.

Keywords: *graph skills, Cartesian plane, plotting points, finding points*

Introduction

The mathematical curriculum for visually impaired students involves the same content areas as for the sighted students. The acquisition of mathematical skills can be more difficult for students with visual impairments due to the abstract nature of many essential concepts and the highly visual presentation of the subject. These difficulties include gaining information about the given problem, the formula to use, the calculations part and the visual presentation of the given problem. Few Portions in mathematics like Geometry, Graphs, Coordinate geometry, Venn Diagrams are highly visual in nature where the visually impaired students require different formats to access materials. Tactile graphics are typically used today. However, tactile graphics are not compatible with computers, require Braille reading skills, and are not used later in employment environments.

Graphs are drawings that show mathematical information with lines, shapes, and colours. Graphs are also known as charts. People use graphs to compare amounts of things or other numbers. Graphs are useful because they can be easier to understand than numbers and words alone. Commonly students with visual impairments learn graphs through tactile graphics. It represents a variety of print illustrations that contain information given in graphic formats.

In addition to providing tactile graphics for their students, it is necessary that Teachers of students with visual impairments teach students how to read and make sense of tactile graphics in mathematics instruction. In order to teach students with visual impairments to be successful in handling and interpreting a variety of tactile graphics, Teachers of students with visual impairment should use a sequence for introduction of tactile graphics (Koenig & Holbrook, 2000). Teachers of students with visual impairment could first present students

with opportunities to handle real objects, transition to the use of models, and finally implement two dimensional representations. The successful reading of tactile graphics requires knowledge of spatial and geographic concepts and strategies for exploring and interpreting the displays (Kapperman et al., 2000). This study concentrate on how the teachers teach the graph skills, the way they offer practice and evaluation of performance of visually impaired students.

Review of literature

Ashley Nichole Nashleanas (2018) in his study "Graph accessibility and comprehension for the blind: A Challenge of its own kind" The Time and Performance and Verbal and Tactile Cues constructs were examined, and no statistically significant differences were found with respect to formal mathematics training. Descriptive analyses of the collective responses indicated that SVI require more time than their peers with vision when completing homework assignments and exams with graphical information.

Spindler, Richard (2006) on their study Teaching Mathematics to a Student Who Is Blind Teaching Mathematics and Its Applications found there are important similarities and also differences as compared to sighted students in teaching strategies, including proper verbal wording of formulas, using simple manipulatives, and repetition. Challenges encountered include instructor resistance, higher dimensional problems, and mental fatigue.

Kim T. Zebehazy and Adam P. Wilton (2014) on their study Charting Success: The Experience of Teachers of Students with Visual Impairments in Promoting Student Use of Graphics investigated the perceptions and practices of teachers of students with visual impairments in Canada and the United States regarding graphics (both tactile and print) that are used by students with visual impairments. Questions focused on quality, importance, and instruction in the use of graphics. Fewer than 50% of the respondents felt that graphics were appropriately adapted on large-scale assessments, that there was sufficient instruction in the use of graphics in mainstream classrooms, or that there was an adequate amount of instructional time to teach the use of graphics. Findings highlighted a need to gain insight into effective teaching strategies that help students gather information from both tactile and print graphics. Attention to students with low vision using print graphics needs to be part of future investigations.

Need of the Study

The purpose of the study is to explore the performance of graph skills among students with vision impairment under inclusive and special school setup .This helps to sort out the problems faced by the special teachers and students with visual impairment while learning graphs particularly performing in Cartesian coordinate system.

Accessing graphs in an inclusive and special school setup have been identified to be problematic for blind students partly due to the lack of teaching resources available and personnel type, support and sufficiency. Hence a survey has been done to find out teaching and evaluation of graph to the students with visual impairment. This study may have a scope of developing a technology based teaching and evaluation of performance of graph to students with visual impairment.

Objectives of the study

The specific objectives of the study were:

- To explore the level of performance of graph skills among students with visual impairment.
- To find out the skills acquired in plotting point in the Cartesian plane using tactile/ any other graphing aid.
- To identify the skills in finding points in the Cartesian plane in the graph using tactile aid
- To examine the mode of answering graph questions in the test and examinations.

Method of the Study

The study was survey in nature. The sample comprised of 30 special teachers from Inclusive schools. The sample was selected using purposive sampling method meaning selecting teachers for the students with visual impairment. The questionnaire was developed based on literature survey and opinions of the experts. The questionnaire aimed to measure the comprehension level of graph concept (i.e.) plotting and finding a point in the Cartesian plane.

Tool of the study

The questionnaire consists of 20 questions and it is subdivided into four parts. Each part contains five questions. First part consists of questions regarding the awareness about the graphs and its types. The second part consists of questions regarding the different parts of the graph. The third part consists of questions regarding the plotting and finding a point in the Cartesian plane. The fourth part consists of questions regarding the mode of answering graph questions in the test/ examinations. The study was conducted in Coimbatore, Chennai and Salem Districts of Tamil Nadu.

Results and Discussion:

This study shows that the 43% of the special teachers were having graphic aid / tactile diagram to teach graph concepts to visually impaired students and others are teaching orally.

A less number of the special teachers taught Bar chart to the visually impaired students, 20% of the special teachers taught Histogram to visually impaired students, 10 % of the special teachers taught Frequency polygon and 36 % of the special teachers taught Pie chart to visually impaired students.

The result shows that 37% of students with visual impairment were identified x and y axis in the Cartesian plane and 27 % of them identifies the origin and the names of the quadrants , 16 % of them able to state the forms of each quadrant and only 7% of them were able to set the scale.

The result shows that only 23% of students with visual impairment were identified the Cartesian plane correctly and only 10 % people were able to find and plot a point in the Cartesian plane.

Nearly 43% of the special teachers responded that tactile graphs are more reliable to teach the basic concepts on the Cartesian plane.

Pertaining to evaluation of graph skills in the tests/exams, all the students with visual impairment used only scribe to plot and finding points in the Cartesian Plane.

Conclusion

The study reported the current situation of how the students with visual impairment learning graph skills. It also found out the method of evaluating their knowledge and skills in performing graph. There were scanty numbers of graphic aid and supplementary aids to teach graph. This study envisages a need to teach graph skills using technology which is the reality in today’s context.

References:

1. Nashleanas, Ashley Nichole, "Graph accessibility and comprehension for the blind: A challenge of its own kind" (2018). Graduate Theses and Dissertations. 16425.
2. Spindler, R. (2006). Teaching mathematics to a student who is blind. Teaching Mathematics and its applications, 25(3), 120-126.
3. Zebehazy, K. T., & Wilton, A. P. (2014). Charting success: The experience of teachers of students with visual impairments in promoting graphic use by students. Journal of Visual Impairment & Blindness, 108(4), 263–274.